

WHAT IS CLAIMED IS:

1 1. An electro-optical switch, comprising:
2 a photonic crystal having first and second waveguides provided therein, wherein
3 the first waveguide is adjacent to the second waveguide along a coupling length, and a change in
4 conductance along the coupling length provides electro-optical switching between the first and
5 second waveguides.

1 2. An electro-optical switch as recited in claim 1, wherein said photonic crystal
2 comprises a periodic array of silicon pillars arranged in a square lattice.

1 3. An electro-optical switch as recited in claim 1, wherein said photonic crystal
2 comprises a periodic array of air holes arranged in a hexagonal lattice.

1 4. An electro-optical switch as recited in claim 1, wherein the propagation constants
2 of the first and second waveguides are equivalent.

1 5. An electro-optical switch as recited in claim 4, wherein the first and second
2 waveguides electro-optically couple to each other at all optical wavelengths.

1 6. An electro-optical switch as recited in claim 1, wherein the first and second
2 waveguides are identical.

1 7. An electro-optical switch as recited in claim 6, wherein the first and second

2 waveguides electro-optically couple to each other at all optical wavelengths.

1 8. A photonic bandgap integrated circuit, comprising:
2 a photonic crystal; and
3 an electro-optical switch formed by providing first and second waveguides in said
4 photonic crystal adjacent each other along a coupling length, wherein a change in conductance
5 along the coupling length provides electro-optical switching between the first and second
6 waveguides.

1 9. A photonic bandgap integrated circuit as recited in claim 8, wherein said photonic
2 crystal comprises a periodic array of silicon pillars arranged in a square lattice.

1 10. A photonic bandgap integrated circuit as recited in claim 8, wherein said photonic
2 crystal comprises a periodic array of air holes arranged in a hexagonal lattice.

1 11. A photonic bandgap integrated circuit as recited in claim 8, wherein the
2 propagation constants of the first and second waveguides are equivalent.

1 12. A photonic bandgap integrated circuit as recited in claim 11, wherein the first and
2 second waveguides electro-optically couple to each other at all optical wavelengths.

1 13. A photonic bandgap integrated circuit as recited in claim 8, wherein the first and
2 second waveguides are identical.

1 14. A photonic bandgap integrated circuit as recited in claim 13, wherein the first and
2 second waveguides electro-optically couple to each other at all optical wavelengths.

1 15. A coupled photonic crystal waveguided system, comprising:
2 first and second photonic bandgap waveguides provided adjacent to each other
3 along a coupling length, wherein a change in conductance along the coupling length provides
4 electro-optical switching between said first and second photonic bandgap waveguides.

1 16. A coupled photonic crystal waveguided system as recited in claim 15, wherein the
2 photonic crystal comprises a periodic array of silicon pillars arranged in a square lattice.

1 17. A coupled photonic crystal waveguided system as recited in claim 15, wherein the
2 photonic crystal comprises a periodic array of air holes arranged in a hexagonal lattice.

1 18. A coupled photonic crystal waveguided system as recited in claim 15, wherein the
2 propagation constants of said first and second photonic bandgap waveguides are equivalent.

1 19. A coupled photonic crystal waveguided system as recited in claim 18, wherein
2 said first and second photonic bandgap waveguides electro-optically couple to each other at all
3 optical wavelengths.

1 20. A coupled photonic crystal waveguided system as recited in claim 15, wherein

2 said first and second photonic bandgap waveguides are identical.

1 21. A coupled photonic crystal waveguided system as recited in claim 20, wherein
2 said first and second photonic bandgap waveguides electro-optically couple to each other at all
3 optical wavelengths.

1 22. A method for providing an electro-optical switch, comprising:
2 providing a photonic crystal;
3 providing first and second waveguides in the photonic crystal adjacent to each
4 other along a coupling length; and
5 changing the conductance along the coupling length to provide electro-optical
6 switching between the first and second waveguides.

1 23. A method for providing an electro-optical switch as recited in claim 22, wherein
2 the photonic crystal comprises a periodic array of silicon pillars arranged in a square lattice.

1 24. A method for providing an electro-optical switch as recited in claim 22, wherein
2 the photonic crystal comprises a periodic array of air holes arranged in a hexagonal lattice.

1 25. A method for providing an electro-optical switch as recited in claim 22, wherein
2 the propagation constants of the first and second waveguides are equivalent.

1 26. A method for providing an electro-optical switch as recited in claim 25, wherein

2 the first and second waveguides electro-optically couple to each other at all optical wavelengths.

1 27. A method for providing an electro-optical switch as recited in claim 22, wherein

2 the first and second waveguides are identical.

1 28. A method for providing an electro-optical switch as recited in claim 27, wherein

2 the first and second waveguides electro-optically couple to each other at all optical wavelengths.